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ABSTRACT

This manual provides detailed instructions for using the different tools and procedures of the microcomputer painting medium developed at the University of Illinois, which enables the user to make pictures on a color TV screen. The user is in immediate and direct control of the picture-making at all times, through his use of two "paddles," buttons on the "paddles," and the keyboard of the microcomputer. Typical equipment needed includes an APPLE II microcomputer, a small color TV set, a modulator between the computer and the TV, two "paddles," and a disk drive or a cassette tape recorder. The MC painting medium is implemented on the computer through a program, MZ1 (mod SBN), written in BASIC language, which is loaded from diskette or cassette tape. An MC painting can also be saved on a diskette or a cassette tape and later loaded for viewing or editing. (Author/CMV)

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The Illinois Series on Educational Applications of Computers

# MC Painting Manual A

## User's Guide

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MC Painting Manual A -- User's Guide

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## 1. Introduction

Microcomputer painting (MC painting) developed by the authors provides a rich, new, easy-to-use artistic medium. It has many applications in art, and also in teaching art, mathematics and computer science. (See References 1 and 2.)

The user makes pictures on a color TV screen. He is in immediate and direct control of the picture-making at all times, through his use of two "paddles"*, buttons on the "paddles" and the keys on the keyboard of the microcomputer. The medium that he controls includes many different tools and procedures for making and editing the pictures.

Typical equipment needed is an APPLE II microcomputer, a small color TV set, a modulator between the computer and the TV, two "paddles" and a disk drive or a cassette tape recorder. The MC painting medium is implemented on the computer through a program, HZ1 (mod SBN), written in BASIC language, which is loaded from diskette or cassette tape. An MC painting can also be saved on a diskette or cassette tape and later loaded for viewing or editing. (See Appendix.)

## 2. General Directions

Details of operation of the APPLE II computer are in the APPLE manuals (References 3, 4 and 5). We assume that the reader knows how to turn the computer on, get into BASIC and LOAD a program from diskette or cassette tape.

After you LOAD HZ1, type RUN and push RETURN if you then push K and RETURN you keep the MC painting that was on the screen. If you

* It is possible to use a single "joystick" in place of the "paddles" on an APPLE and on some other microcomputers.

just push RETURN the painting is erased. You thus have a choice of keeping the old painting for further editing or of starting afresh.

The program sets the display for a 40 x 40 colored picture with 4 lines at the bottom of the screen for various messages to the user. You will see the first message at the bottom of the screen, and a blinking "cursor" which moves as you move the paddle. The cursor shows where you can paint on the screen or pick up a color.

The many different options that you have in MC painting are controlled by buttons and keyboard keys, as explained in the next section. You should know about two of these keys right now though.

The O ("oh") key takes you OUT of the program. The L key prints your picture that's on the TV screen on a printer. (Don't push this key if the printer is not connected. However, if you do, you can reenter the program with RESET, control C, RETURN, RUN, RETURN.)

Now you have a choice: study the different options in the next section OR skip to Section 4 and try out some of the options before studying Section 3.

## 3. Buttons, Keys and the Paddles

### 3.1 Categories Of Tools

Elementary MC Painting Tools: the paddles 0, 1; keys C, G, P,T

Additional MC Painting Tools:

| | |
|---|---|
| Brushes | keys 1-4 |
| ½ Lines; Diagonals | keys H, I, V, W, D, E |
| Block Printing | keys 7, 8, 9, 0 |
| Special Help and Control: | keys A, B, K, L, M, N, O, X, ESC/ |

As seen in the next section, the labels of many of the keys are the initial letters of the functions that they control.

3.2 Index of Tools discussed in Section 3.3

| Key | Function |
|---|---|
| A | Help A |
| B | Help B |
| C* | Get color |
| D*, E* | Diagonals |
| G | Ground color |
| H*, I* | Horizontal ½ lines |
| K | Keep old MC Painting |
| L | Color coded print |
| M, N | Color mapping |
| O | Out |
| P | Palette |
| T | Background |
| V*, W* | Vertical ½ lines |
| X | Print X, Y coordinates of cursor |
| 1*, 2*, 3*, 4* | Four brushes |
| 7*, 8*, 9*, 0 | Block printing (see Help B) |
| ESC [/ Shift between "dab" & "stroke" modes] | Interrupt plotting after push key D, E, 2, 3, 4, 8, 9, or N |

* Holding down the REPEAT key with any of the keys marked with an asterisk repeats the function controlled by the key. As the paddles are moved this repetition is made visible on the screen.

### 3.3 Functions of the Paddles, Buttons and Keys

Elementary MC Painting Tools

--Paddles and Cursor: As you move the paddles, the (blinking) "cursor" moves on the screen and in the same direction that you moved the paddles. Moving the paddle and cursor (in MC painting) is like moving a real paint brush near a canvas (in ordinary painting) but not touching the canvas.

--Buttons: Whenever you touch button 0 you put a spot of color or "dab" on the screen wherever the cursor is. If you hold down button 0 while moving the paddle-cursor-brush you paint a continuous line or "stroke".

If you touch button 1 you shift from "dab" to "stroke" mode and vice versa. In the "stroke" mode you do not need to hold down button 0 to make a stroke

Both hands are then free to move the "brush"!

--Keys:

-C- to pick up the color at the position of the cursor (i.e., the color from anywhere on the screen) and put in on your brush. The color code appears below that color in the palette, thus serving as a brush color indicator.

-G- to put the current brush color on the whole screen as a ground color.

-P- to restore the palette at the bottom of the screen and plot the code of the brush color.

-T- to erase the palette.

Additional MC Painting Tools

--Keys:

-1, 2, 3, 4- Four brushes. Push one of these keys to get a dab of color in any of four shapes. The color painted is the color on the brush, shown by the brush color indicator. Hold down the repeat key with one of the four keys to get a continuous broad or narrow brush stroke as the paddles are moved slowly. Key 1 plus the repeat key does the same thing as button 0, but the plotting is somewhat slower.

-H, I, V, W- Touch one of these keys to draw a straight line from the current cursor position to the right, left, top or bottom border of the screen respectively.

-D, E- To draw diagonal rows of spots at any angle. Touch D and type the increment (or step) in x, push -RETURN-. Do the same for the y increment, and the diagonal row of spots is plotted automatically from the cursor position to the border of the screen. The increments may be positive or negative. Move the paddles and touch E and the diagonal row is drawn from any cursor position in the direction specified by the most recent values of x and y increments you've given.

-7, 8, 9, 0- Block printing (a repetition of a stored motif at different positions on the screen)

-0- restart, i.e., push this before storing a new motif. The marker is plotted at the position of the cursor and in a color that's always different from the color that was there before key 0 was pushed. (Push it twice and you get the original color!) The marker is moved to the

cursor position each time you plot the motif by pushing key 8 or 9. You can therefore edit the motif at any time.

-7- pick up another spot for the motif, i.e., store its color and its position relative to the marker.

-8- plot the motif (using the colors and relative positions that have been stored) i.e., spots are painted as though the motif marker is now superposed on the cursor position.

-9- same as 8 except that the current brush color is used in plotting all points in the motif, instead of the colors stored for each spot in the motif.

Special Help and Control

--Keys:

-A, B- A gives help for using the functions other than block printing, and B gives help for the block printing.

-K- keeps the old painting on the screen.

-L- prints on the printer output the title, artist and date for your painting and prints the current painting on the screen as color codes* Do not use unless a printer is connected.

-M, N- maps the colors within a "window" in the painting to a new set of colors without changing the pattern. Set the cursor at the upper left corner of the "window" in which you wish color mapping to take place. Push M and choose among the three kinds of color mapping. Set the cursor at the lower right corner of the "window" and push N. You can repeat the mapping by pushing N again and also change the lower

* See reference 3, p. 29 or reference 4, p. 32.

right corner of the window, if you wish, by moving the cursor before pushing N. The ESC stops the mapping.

-O- jumps out of the program and retains the GR (color graphics) mode of the painting.

-X- prints X and Y, the coordinates of the cursor position

-ESC- interrupts plotting of spots when it is pushed soon after key D, E, 2, 3, 4, 8, 9 or N.

## 4. Your First MC Painting

When you start the HZ1 program you will see a blinking "cursor" on the TV screen. Try moving the paddles to control the horizontal and vertical motion of the cursor. You see that the cursor moves right or left as you turn paddle 0 and up or down as you turn paddle 1. You are moving your paint brush across the screen (canvas) but not quite touching it.

Painting: Button 0 and Key 1. Now touch BUTTON 0 on the first paddle or push key 1 on the keyboard, and move either paddle slightly. You see that you have put a "dab" of white (a white square) on the screen where the cursor was when you pushed the button or key. Move a paddle some more and put dabs here and there by pushing button 0 or key 1. (If you move the paddles slowly and tap the button or key repeatedly you'll draw a straight or zigzag line.) But wouldn't you like to have an easier way to draw a line?

Hold down button 0 OR hold down both key 1 and the REPEAT key and move the paddles while holding down the button or the two keys. Aha! Now you're drawing a line or a zigzag diagonal. You're well on the way to making your first picture. Have fun drawing various shapes.

Move the paddles slowly and you get a continuous line. Move it fast and you get broken lines, as you hold down the button or the two keys.

You can also draw a continuous line or stroke by tapping button 1 (not key 1) and then moving the paddles without holding down button 0 or keys 1 and REPEAT. Tap this button 1 again when you wish to return to the "dab" mode.

Your picture is made up of little squares, forty at most in each direction, so the fat lines and the zigzag diagonals are characteristic of this type of MC painting.

Color. You probably don't want always to paint with the same color. You have a choice among 15 colors. The P, C and G keys help you choose the use of different colors.

Push P. There at the bottom of the screen is your full palette of 16 colors (including the black, which is lost in the background black if you erased the old MC painting.) You use the MC painting palette much like the artist's palette.

Move the paddles so that the cursor is on top of the color in the palette that you want to put on your brush. Push C. The code number of this color will appear below its position in the palette. Now move the paddles-brush* somewhere else on the screen and paint or dab. (You remember: push key 1 or button 0.) Now you've painted a dab of the new color you picked, and of course you can also paint continuous strokes in this color that's on your brush. At any time you

*Notice that we can often use the words brush, cursor or paddles interchangeably.

can "see" what color you have on your brush by pushing key P. The color code is then plotted below its position in the palette. (You will find this especially useful in doing color mapping with keys M and N.)

Try picking up other colors (noticing how the code is shown each time) and painting with them, a dab or a line. What happens when you paint with a new color on top of another color? RIght. You don't mix the colors but just put the new color there.

Now for something you cannot easily do with the ordinary paint brush!

Move the brush (cursor) to ANY spot on the screen and push C. What does the indicator show? Yes, you picked up the color that was there and put it on the brush. You can get a color on the brush from ANY spot on the screen, not just from the palette. (But you need the palette if you want to put on the brush a color which is not yet on the screen.)

Try this a few times: get a color from some spot on the screen and paint with it. Then, get BLACK on your brush (from the background or the palette) and paint over some spots that aren't black. Now you see how to ERASE what you have painted, using the "ground color," which in this case is black.

To get HELP(!) push key A or B and you will see lists of what each key does.

Ground color. You noticed that the screen went all black when you hit RETURN to start the program after pushing some key other than K. Black was then your "ground color." But you can have any color you want as the ground color. To see how to choose it you'll have to

sacrifice that pretty practice picture you've made. First notice the color on your brush (shown by the indicator). Then push G. Your whole screen (above the four lines reserved for text) is now the ground color you chose, i.e., the color on the brush.

Try making a new picture with colors painted on this ground color. You remember that you need to push P again to get the palette, and use C to pick any color you want to get on the brush. And of course if you push G again you'll get the ground color all over your screen, the same color as you had most recently on the brush.

When you are admiring your MC painting you may not want to be distracted by the palette, which isn't usually part of your picture. Push T and the bottom line on the screen is erased to the ground color. Push P again and you get back the palette and color code. Sometimes you may want to push P anyway, just to restore the palette if you've accidentally changed it by painting over part of it. If you want to see the code of any color you encounter as you move the cursor, try holding down C and REPEAT keys.

When you're ready to try some new tools in MC painting, try the other keys described in Section 3.

Now you've experimented with all the elementary tools in MC painting. You can enjoy painting for many hours just with these tools. There are many more pictures that can be made with MC painting than you and all your friends could make in ten lifetimes. In fact, there are some $16^{1600}$ pictures possible!

If you want to record your MC painting for yourself and your friends try taking a color photograph. A red filter helps and TV adjustment to full brightness (without distortion of colors). Your photography store can give you more detailed advice.

A second way to record your MC painting is with the help of key L. And if you wish to save your painting so that you can see it again or change it, see the Appendix.

## Appendix. Saving and Loading MC Paintings

To save a painting on a diskette you have made on the TV screen:

1. Push key C ("oh") to jump out of the program.
2. Type:

   BSAVE name, A10204,L1024 and push RETURN*,

   where "name" is the name of your painting.

   When the light on the disk drive goes off, type

   CATALOG and push RETURN

   to check that you have saved the painting on your diskette.

To load a painting from a diskette type GR and push RETURN to get in the color graphics mode and then type

BLOAD name and push RETURN

The painting will then appear on the TV screen. If you want to modify the painting be sure to push key K after you start the program with RUN and RETURN, rather than some other key, so that your picture will be preserved for editing with the help of the HZ1 program.

Using a cassette tape to save and load MC paintings, is a less simple procedure than for the disk operations. You may use modifications of the procedures shown on pp. 34-42, and p. 69 of Reference 3.

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* If the APPLE refuses to write on the diskette (because RESET had been pushed earlier) you can recover control by typing
CALL 976 and pushing RETURN.
(see p. 17 of Reference 5.), and follow this by
CATALOG and pushing RETURN
if you have changed disks after booting up.

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5. Disk II Floppy Disk Subsystem Installation and Operating Manual (Apple Intelligent Subsystems), September 1978.